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ABSTRACT

This paper reports on an on-going action research project that attempts to establish a science education learning community. A pluralistic theoretical perspective influenced by post-critical theory, postmodernism/poststructuralism, and feminism is used in the examination of the challenges in developing a learning community among student teachers, classroom teachers, and university faculty. One prominent research outcome in the findings is the recognition of the need to address the "sacred stories" of university practice which contributes to maintaining the established power/knowledge relationships and maintaining the master narratives in teacher education. Contains 33 references. (Author/JRH)

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THE SEARCH FOR ROUTES TO A COMMON GROUND FOR THE BUILDING OF A COMMUNITY OF CO-LEARNERS

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Abstract

This paper reports on an on-going action research project which is attempting to establish a science education learning community. By assuming a pluralistic theoretical perspective which has been influenced by post-critical theory, postmodernism/poststructuralism and feminisms I have been involved in the examination of the challenges in developing a learning community among student teachers, classroom teachers and university faculty. While there have been many outcomes one research outcome that will not go away is the recognition of the need to deal with the "scared stories" of university practice which contributes to maintaining the established power/knowledge relationships, and maintaining the master narratives in teacher education.

A Science Education Learning Community Story

Since the Fall 1993 I have been involved in an on-going action research project where I have been attempting to facilitate the construction of a science education learning community. I shall call this project the Science Education Learning Community Project (SELCP). The focus of SELCP has been on the building of a community of learners where university faculty and teachers would become co-learners in the process (Bollough, & Gitlin, 1995; Greenleaf, 1995). This project therefore is not only working towards the improvement of practice, but the construction of a science education learning community where teachers are empowered to become full participants in the process.

In undertaking such research I recognize the need to deal with the fact that the issue of empowerment is problematic. Gore (1992) highlights the problematic presuppositions and unreflexive use of empowerment literature. Some of the problematic presuppositions which she identifies are (1) an agent of empowerment, namely a process which requires an agent - someone, or something to em-power; even the notion self-empowerment presumes the

agent self, (2) a notion of power as property - something the teacher (science educator) has and can give to the students (preservice/inservice teachers); it is often associated with zero-sum understanding of power and that if teachers (science educators) give some of it to students (preservice/inservice teachers), they must give up some of their own, and (3) some kind of vision or desired state - the perpetuation of a dichotomy between empowerment and oppression also stems from a shift in conceptions of power as repression to power as productive, such that empowerment is linked with a productive conception of power and oppression is linked with a repressive conception (pp. 56-61).

In terms of the unreflexive use of empowerment Gore's major concern about the politics of empowerment stems from the agent of empowerment. Given that the agent is usually the teacher (or in this case a science educator), and that the subject (or object) of empowerment is "Others"(preservice/inservice teachers), a distinction is implied between us and them. Therefore, there is danger apparent in the work of academics (such as myself) whose discourse is purportedly empowering for the teachers (and others). In focusing on "Others" there is a danger of forgetting to examine one's own (or one's group's) implication in the conditions one seeks to affect (Gore, 1992, p. 61). If empowerment is constructed as the exercise of power in an attempt to help others to exercise power (rather than the giving of power), I must confront the unforeseeable and contradictory effects of the exercise of power and be humble and reflexive in my claims. However, my focus has been on examining the success (of this academic) at achieving the goal (the construction of a science education learning community) rather than a critique of "Others".

The effort to move from a traditional university-driven model of professional development for science education, to one that leads to a more collaborative model is a process I have been involved in science, for this past three years. I was motivated to engage in this research because traditional teacher preparation programs have many limitations such as:

(1) being top down, with the university faculty telling preservice/inservice teachers what to do,

(2) having its primary focus on serving the needs of preservice teachers,

(3) separating theory and practice,

(4) providing limited opportunities for inservice teachers to be connected to a teacher preparation process which benefits their own development, and

(5) limited opportunities for university faculty to redefine their role in the process.

Such limitations has resulted in my need to create a teacher preparation program where we could:

(1) create a school-based, bottom up collaboration between university faculty and inservice teachers,

(2) explore professional development links between preservice and inservice science education,

(3) provide for field-based opportunities for the natural exploration of a blending of theory and practice,

(4) involve inservice teachers in the professional development of preservice teachers, and at the same time create opportunities for their own professional development, and

(5) redefine the university's role in the process.

A major component of the initial vision which was adopted to achieve these objectives was the establishment of *elementary science emphasis sites* (Parsons & Reynolds, 1995; Parsons, 1996). This was recognized as a variation of the Holmes Group (1986; 1990) concept of a professional development school. The Holmes Group promotes the idea of a professional practice school where teachers are actively engaged in the improvement of practice. We wanted to explore the idea of the improvement of professional practice with science as a focus. The vision was at these Science Emphasis sites we would collaboratively working towards improving practice and promoting self-empowerment of preservice and inservice elementary teachers in science;

at the same time work towards the improvement of the university's role in the process.

Wilson, McCelland, and Babazak (1995) following upon the recommendations of the Carnegie Task Force; the Holmes Group explored the combining of the two roles of cooperating teacher and college supervisor into one known as the "clinical master teacher". At a practical level this is one solution, but it still does not deal with the need to change the overall role of the university in the process. A refreshing perspective on the need for change by university faculty in how they interact with schools is presented by Connelly and Clandinin (1992). They note that university faculty are central characters in the "sacred story" of expert, knowledge relationship with schools. This results in the fact that rarely do university researchers recognize the autobiographical nature of their work with schools[1]. They fail to see that their work is embedded in, and also under study when they engage in work with schools. Typically science education research has focused heavily on inservice teachers improving their practice (Tobin, Davis, Shaw & Jakubowski, 1991), and in some cases preservice teachers (Abel & Roth, 1994; Martens, & Crosier, 1994). While such research has been respectful of teachers as professionals and sensitive to their needs, it has typically been theory driven, with the university science educator being in the position of power. This power imbalance has resulted in a lack of reflection by the university faculty on their practice. In response, Tippins, Nichols, & Tobin (1993) talk about creating a community of learners where the university faculty would become co-learners in the teacher preparation process. Kagan and Tippins (1993) suggests that university faculty work in a supportive rather than dominant role where their role would be to provide liaison with the university, and staff development. If we want to create such learning communities - then both universities and schools need to collaboratively

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[1] I have reported extensively on the autobiographical connection of my work with preservice/inservice teachers, as illustrated in Parsons (1996); Parsons & Quintanar (1996); Parsons & Matson (1995); Parsons, Matson, & Rohan (1995).

restructure the teaching and learning process. Not only do we need to restructure the process, but works such as Greenleaf (1995) point to the need for the nurturing of new learning communities. For collaborative research to occur then it is important to critically reflect on the university's role in the process to date at creating such a community of co-learners.

Making Sense of the Process

In examining the evolving process of establishing a science education learning community an action research agenda was assumed. *Action research* in its classical sense, is a term used to describe a family of activities in curriculum development, professional development, school improvement programs, and systems planning and policy development (Kemmis, 1982). SELCP involves all of these activities. What these activities have in common is the identification of strategies of planned action which are implemented, and then systematically submitted to observation, reflection and change. Also, the participants in any given action are integrally involved in all of these activities. Lewin probably best summarizes action research when he describes it as consisting of analysis, fact finding, conceptualization, planning, execution, more fact-finding or evaluation, and then a repetition of this whole cycle of activities — indeed a spiral of such circles (Kemmis, 1982).

Action research has continued to evolve as evidenced in the work of Hopkins (1985) to include teacher research. This has provided focus for the ultimate goal of this project which is to have not only myself but teachers actively involved in the research process. We are informed by works such as, Loughran and Northfield (1996), which illustrate self study by a university science/math educator. Also, by Davis (1996) who examines the use of autobiography as a form of teacher research for classroom teachers. She is one of the few science educators who makes the connection between action research and autobiography. The teachers involved in her work used

autobiography as part of an action research process. Another possible way of framing action research is linking it to a feminist praxis which is developed in the work of Hollingsworth (1994). Works such as this illustrate the connection of self to practice at the classroom level. Specifically, Hollingsworth in her longitudinal action research with beginning teachers introduces the concept of "collaborative conversations" as a way of making sense of, and improving practice (p.4). Similarly SELCP has evolved to examine the longitudinal cycle of collaborative activities that has been continually examined to provide new directions for the establishment of a science education learning community. While initially, I was attempting to become critical of the university's role through the process of action research, my work has evolved to where I am now focusing on the utilizing feminisms (Nicholson, 1990) as a basis to examine the autobiographical connection to this research project. Since I am the part of the story that is university connected in this sense this action research project has also been informed by my on-going autobiographical analysis of my practice (Parsons, 1996; Parsons & Quintanar, 1996; Parsons & Matson, 1995; Parsons, Matson, & Rohan, 1995).

While critical theory was initially useful to me in pointing out the underlying struggles. I now, like many feminists (Lather, 1991; Luke & Gore, 1992) have come to view critical theory to be insufficient to differentially explain experiences. I am now informed by more recent feminist literature which has come to view critical and earlier feminist theory as adding to the pertuation of their own master narratives. This position can be described as "post-critical" which is the resistance to claims to view the world from a unified stance. While this can viewed by some as a paralyzing act for me it is an acknowledgment of the usefulness of multiple frames of reference. The focus of the my analysis in this paper however will be on an examination of the 'sacred stories' associated with only one frame of reference, the university's role in the process.

Before reviewing the sacred stories associated with the SELCP, it is important to consider the aims of action research. Grundy and Kemmis

(1982) see action research as having two essential aims — to improve and to involve. Specifically, action research aims to improve in three areas: the practice, the understanding of the practice by its practitioners, and the situation in which the practice takes place. Since both aims (improvement and involvement) are integral parts of SELCP, I have continued to examine all university generated activities associated with the project from this perspective. The focus therefore will be on describing the university-school interactions (Hitchcock & Hughes, 1989; Lieberman, 1988). Because I am intimately involved in the process the focus is also autobiographical. I will acknowledge that I am only sharing one side of the story. There are other aspects of the story which need to be shared and that is preservice and inservice teachers side of the story. We need to get to the point where teachers are able to share; have equal voice in the interpretation. My writing their stories will not do that.

When viewing the collaborative activities associated with the SELCP, as action researcher I am inevitably concerned with the politics and processes of innovation and change. Carr and Kemmis (1986), working from a critical perspective initially, provided a useful interpretative framework for my work. They use the Habermasian concepts of technical, practical and emancipatory to define different types of action research. This categorization was a useful framework for initial analysis of outcomes (Parsons, & Reynolds, 1995). In an attempt to describe the postpostivist paradigms for generating and legitimating knowledge I now find Lather's work insightful (Lather, 1991). Specifically, her use of Habermasian categories of human interests: prediction, understanding, emancipation, plus she adds her own category of deconstruct. Under these categories she places various theoretical positions in the following manner - prediction (positivism), understanding (interpretive, naturalistic, constructivist, phenomenological, & hermenuetic), emancipation (critical, neo-Marxist, feminist, praxis-oriented, educative, Freirian participatory, action research), and deconstruct (poststructural, postmodern, post-paradigmatic diaspora).

Since the first three positions have been more widely reported in the literature (Carr & Kemmis, 1986) it is necessary to pause briefly to examine the fourth position - deconstruct. Central to postmodernism/poststructuralism position is an anti-foundational epistemology which rejects foundational truths in disciplinary knowledge and the unitary rationalist subject as foundational to all knowledge (Luke & Gore, 1992). The deconstruction of knowledge claims under the poststructuralist banner is commonly characterized in most Australian, British, and Canadian work. Whereas in the United States deconstruction tends to claim alliance with postmodernism. For the purposes of this paper both postmodernism and poststructuralism will be used interchangeably because both reject a foundational epistemology.

Before reporting on the research outcomes it is important to point out the action research cycles[2] which have been used as a basis of analysis in the project:

1. Cycle I (Spring '93-Fall '94)	Initiating Collaborative Relationship[3]
2. Cycle II (Fall '94-Spring '95)	Establishing Collaborative Relationship & Community of Co-Learners
3. Cycle III (Fall '95-Spring '96)	The Search for Routes to a Common Ground for the Building of a Community of Co-Learners
4. Cycle IV (Fall '96-Spring '97)	The Continued Search for Routes to a Common Ground: Dealing with the Sacred Stories

For initial analysis the following Habermasian conceptual categories (Carr & Kemmis, 1986; Lather, 1991) were used to evaluate the action research outcomes which illustrate the "sacred stories" during the first two research cycles:

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[2] Cycle in this case means the block of time that was used to complete an action research reporting period.

[3] Titles given to the cycles describe the primary outcome during that period.

1. Technical Action Research/Prediction

   Participants Roles - Facilitators have cooped practitioners into working on externally-formulated questions which are not based in their practical concerns.

   Focus of Research - It employs techniques to create and sustain the investigation of issues raised by outsiders, and it frequently concerns itself almost solely with the efficiency and effectiveness of practices in generating known outcomes.

   Type of Outcomes - It may lead to the improvement in practices from the viewpoint of the outsider, and frequently concerns itself almost solely with the efficiency and effectiveness of practices in generating known outcomes.

2. Practical Action Research/Understanding

   Participants Roles - Facilitators form cooperative relationships, helping them to articulate their own concerns, plan strategic action for change, monitor the problems and effects of changes actually achieved. Participants monitor their own educational practices with the aim of developing their practical judgment as individuals.

   Focus of Research - The facilitator's role is Socratic: to provide a sounding-board against which practitioners may try out ideas and learn more about the reasons for their actions, as well as learning more about the process of self-reflection.

   Type of Outcomes - Practical action research may be a stepping-stone to emancipatory action research in which participants themselves take responsibility for the Socratic role of assisting the group in its collaborative self-reflection.

3. Emancipatory Action Research/Emancipation

   Participants Roles - The practitioner group takes joint responsibility for the development of practice, understandings and situations, and sees these as socially-constructed in the interactive processes of educational life.

Focus of Research - All groups assume equal status in the process

Type of Outcomes - The critical impulse of research is towards the transformation of educational institutions is expressed not only in individual thinking but in the common critical enterprise of changing selves in order to change the institutions those selves generate through their joint practices of communication, decision-making, work and social action.

During the last two research cycles, borrowing from Lather's work, I have added a fourth category -- my interpretation of what a deconstructivist action research agenda would look like:

4. Deconstructivist Action Research/Deconstruct

Participants Roles - There is a recognition of what is needed for the practitioner group to take joint responsibility for the development of practice, understandings and situations, which are socially-constructed in the interactive processes of educational life. This is recognition that there are multiple perspectives on this process.

Focus of Research - There is a recognition of what is needed for all groups to assume equal status in the process.

Type of Outcomes - The critical impulse of research is towards not only the transformation of educational institutions of "others" but "one's own". The recognition that it is not enough to focus on the common critical enterprise of changing selves in order to change the institutions.

The analysis of the activities reported in cycles 1, and 2 reflect the organization provided by the first three categories. The focus aimed for in cycles one and two was on movement towards an emancipatory agenda. In the analyses I have described this as the *early analysis of sacred stories*. In cycles three and four the focus started to shift towards examining activities from a deconstructivist. This is what I have described as *recent analysis of sacred stories*. By the end of cycle three I began to describe SELCP as being positioned within the latter two categories (emancipation and deconstruct), as

described by Lather. I also felt that this critique of my action research agenda was timely, given the critique of modernism that had been on-going in science education this last decade.

Early Analysis of Sacred Stories

Cycle I (Spring '93-Fall '94): Initiating a Collaborative Relationship

The first cycle the SELCP involved initiating a collaborative relationship. Appendix 1[4] presents a summary of the analysis of SELCP Activities using the categories of technical, practical and emancipatory, and level of activity (university and/or school) as a framework for analysis of the first cycle of the project.

Summary of Reflections[5] at the End of Cycle I (Spring '93- Fall '94): Initiating a Collaborative Relationship. The first cycle of the project involved initiating a collaborative relationship. The focus, in the first year, was on teacher preparation, and as such it did little to create anything close to an emancipatory action research climate for the inservice teacher practitioners. However, we can not achieve a new model for science teacher preparation routed in practice without teachers becoming partners in the process. It was evident that it would take extended time to establish an emancipatory action research climate at the classroom level. Carrying out such an agenda is a developmental process which needs time to mature. Also, it requires a shift from teachers *aiding* in the establishment of the science emphasis program (technical-practical) to the teachers *shaping* how such a program might develop (emancipatory). In addition, the activity must move from being *theory driven* to *theory generating* in its orientation. Moving towards theory generating action research at the practitioner level requires a greater participation by teachers.

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[4] A similar analysis was completed on the activities completed during cycles II-IV.

Cycle II (Fall '94-Spring '95): Establishing a Collaborative Relationship and a Community of Co-Learners

During the second cycle of the SELCP (Fall '94 - Spring '95), we saw the beginnings of both a collaborative relationship and a community of co-learners. Again an analysis of SELCP Activities was undertaken, using the categories of technical, practical and emancipatory, and the level of activity as a basis for analysis.

Summary of Reflections at the End Cycle II (Fall '94 - Spring '95): Establishing a Collaborative Relationship and a Community of Co-Learners. During the second cycle of the SELCP we saw the beginnings of both a collaborative relationship and a community of co-learners. With the establishment of a science emphasis sites, the attempt to move towards greater teacher empowerment at the preservice/inservice levels has been initiated. We have learned that spreading the sites throughout districts is possible but to achieve in-depth collaboration we may have to limit our work primarily to certain districts, and even to certain sites within those districts. This is a difficult decision because we see promising undertakings happening across districts. On the other hand we know that some school sites are more promising than others.

Our efforts have been primarily on the preservice component and the establishment of the idea of science emphasis sites. However, we now need to focus on defining inservice teachers' needs. A collaborative framework has begun, but it is delicate. Efforts need to focus on the collaborative development of a future agenda based on common needs. Both the university and the schools share a common link in preservice education but we need to redefine this common ground. Inservice education also has a shared focus at both the university and school levels. While we do not need to reach a consensus on these agendas it is possible to establish a *common*

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5 The Summary Reflections are an indication identified patterns and themes noted at the end of each cycle.

ground. Becoming co-learners in redefining teacher preparation, is part of professional life-long learning for all participants.

Recent Analysis of Sacred Stories

Cycle III (Fall '95-Spring '96): The Search for Routes to a Common Ground for the Building of a Community of Co-Learners

During the third cycle of SELCP (Fall '95 - Spring '96) my overall focus started to move away from a need to develop activities leading to an emancipatory agenda -- to a need to deconstruct the overall agenda. This was the perspective taken in the analysis of activities during cycle III.

Summary of reflections at the End Cycle III (Fall '95 - Spring '96): The Search for Common Ground. At the end of cycle III of the project, we have made more significant gains, but recognize that our long term goal, to establish a true collaborative relationship with schools, will take a long time. The greater gains at this point in the process are in part due to the significant amount of time invested in my work with the schools. In some cases this has lead to partnerships with a group of schools in the San Jose area, known as the River Alliance. Another significant factor is the appointment of a new division head who understands and supports my work. The in-house support is needed to make significant gains in the field. Buy in at the school site level and support in-house is critical. Nevertheless, continued reflection (in, on, and away from the action) will contribute constructively to the next cycle of planning. If I want to learn more about the process I have to go with the sites that are the most promising, or what I would call "Hopeful Sites". I do this knowing there is huge differences in agenda amongst the stakeholders.

This decision making is happening at the same time when I am aware that I feel a need to deal with the *sacred stories* of university practice (Connelly & Clandinin 1992). There is a focal interest in signification, in examining the power/knowledge relationships, in the harm done by the

master-narratives, and in the way institutional structures are controlled. Therefore in my work with preservice/inservice teachers there is a need for sharing of "power", "voice", and "ownership" as we begin to establish new ways of working in schools. Ellsworth (1992) notes the problems associated with the concept of "voice" in liberatory discourses in education. She also notes to argue for the pluralization of voices would imply a correction through addition which would lose sight of the contradictory and partial nature of all voices (pp. 104 & 109). Hence my search for *common ground*. The reality is most university teacher education programs does not examine such issues. Gore (1992) notes that rather than make pronouncements about what we can do, we need to ask "what can we do for you?" (p.62). I would also add what we can do together. This on-going action research project is but one small step in that direction. This search for *common ground* however is all happening at a time when there are external pressures for collaboration between school districts and universities. My work with teachers to date suggests that "asked for" collaboration because you want it will not work.

Cycle IV (Fall '96 - Spring '97): The Continued Search for Routes to a Common Ground -- Dealing with the Sacred Stories

During the forth cycle (Fall '96 - Spring '97) my focus was on the need to deconstruct the activities associated with the overall agenda. A deconstructivist perspective was therefore assumed in the analysis.

Cycle IV (Fall '96 - Spring '97) The Continued Search for Routes to a Common Ground – Dealing with the Sacred Stories. While a preliminary analysis of this year's accomplishments looks great on paper I know the *real struggle for change* needs to begin. Some of the theoretical tones raised will give some idea of where *"we"* are going. So I shall share with you *where I think we are* . . . from the perspective of dealing with the sacred stories; *where I think we are going* . . . but most important I am interested in others thoughts and ideas of how to proceed from here.

In California right now, I really sense that teacher education – as we have known it – is starting to be reconfigured. The traditional teacher education programs configured within universities is starting to unravel. Throughout the state the are alternative routes to teacher preparation which are starting to appear. While I feel excited about this potential I know the huge challenges ahead. Many of my colleagues will resist this process because of a need to preserve the *sacred rites* within the university. Also, I know from my own work that a tremendous effort will be needed to develop relationships where little history of true collaboration exists. The fact that we are encouraged to move ahead with the creation of university-school partnerships is also becoming a very political act, being encouraged by politicians at the state level. This influence will automatically cast suspicion on the process. The history of politics and education also suggests that care is needed. It is clear to me that teacher education needs to chance, but how this happens is critical. I really sense that educational history is being written. Some of us sense we are "on the verge" where there is no new model yet.

Those of us who are interested in true reform of teacher education; are motivated, can learn from work that has already happened. One example from the literature is Stoddard (1993). In her discussion of some unsuccessful collaboration activities within university-school partnerships she notes that we need to find ways to work together to find "a practical theory of pedagogy". To achieve this she suggests that we not only need to over come the obstacles of dissonance between university and school culture, but between groups of faculty members within Colleges of Education. While Fedock, Zambo and Cobern (1996) have focused on the need to bring scientist into schools to understand the work of science educators we have forgotten that some of our colleagues in the Colleges of Education need the same experience. My work suggests that if Colleges of Education do not start to value work in schools then the gap between the cultures will never be bridged. My work also suggests that just as we ask teachers to reflect of their work we also need to reflect on our work. We need to acknowledge the autobiographical

connection. If the autobiographical connect is not made then fully collaborative university-school partnerships will not happen. It is important that Colleges of Education not continue to "mirror" ideologies embedded in the practices of a critically reflective institutions. While it is important for science educators to reach out to the scientific community it may be more important that we also overcome the political hurdles within our own community. This is critical to the survival of the education community within the university. I feel it is important to work within to change the institutional structure before it is changed from the outside. Certainly work on university school partnerships that look at depth of collaboration suggests that a collaboration of any depth will take time. Hopefully the time invested already in this project will be meaningful as we move ahead building the learning community. From what I have seen K-12 schools appear to be responding to change faster than universities. This imbalance needs to be changed. Far too often university being the power/knowledge broker asks the schools to change without undergoing change itself. A true university school partnership will involve both partners fully participating in change over a long period of time.

Discussion: Challenges in Building Science Education Learning Community

My research efforts to date can only claim modest accomplishments as demonstrated by: (1) continued efforts to establish a community of co-learners, and (2) continued exploration of strategies to move from action research which is theory driven, to theory generating. Results to date (1) have implications for expectations of the amount of time necessary to effect systemic change within the learning community, as well as the multiplicity of tasks at many levels that must be carried out, (2) confirms the value of long term investments of resources in reform agendas which will lead to new models and frameworks for professional development of student teachers,

classroom teachers, and university faculty in science education, and (3) the need to deal with the *scared stories* within the university.

The employment of an action research agenda with an autobiographical connection carries with it a responsibility for transformative action, at both the school and university levels. It is hoped that the sharing of this project will be useful to others interested in the social and self-empowerment of teachers in science; at the same time interested in the reform of their own role in the process.

By staring out first with a classic action research agenda, and at the same time beginning an autobiographical analysis of my own practice from a feminist perspective I have now come to a point where both agendas have merged. I have also come to critique my own quest to help facilitate the empowerment/emancipation of others. It has also made me aware of the need for my own empowerment within a university context. By focusing on the conditions needed to improve the practice of others I have also come to understand what is needed to improve my own practice. Being a female, immigrant, and from working class background does not give me ready access to the American university power structure where I work. Within the context of academe I recognize that from the point of view of a feminist praxis I need to kill the angel[6] in academe (Hollingsworth, 1996). To do this I must learn how to deal with the master narratives within academe. I have also come to realize that what is empowering for me might not be empowering for others (preservice/inservice teachers). As a feminist, I realize that care needs to be taken not to add to the development of more master narratives in science education.

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6 Hollingsworth proposes that just as Virginia Woolf had to kill the angel in the house as academics we also need to kill the angel within us to deal with the power/knowledge relationships within academe.

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Appendix 1: Analysis of Sacred Stories

Cycle I Activities

1. **Type of Action:** Practical - Emanicpatory **Activity level:** University **Activities:** The development of plans for a M.A. level science education program. **1.01.** The offering of two masters courses for elementary science education students in the Spring 94. **1.02.** The development of a program proposal for a masters in teacher education with a science education concentration. **1.03.** The development a science education seminar series for M.A. level students. The goal was to establish a sense of science education community at the MA level.
2. **Type of Action:** Technical - Practical **Activity level:** University/School **Activities:** The development of a futuristic vision for preservice /inservice elementary science education. **2.01.** Initiated a process to identify the essential elements which need to be incorporated into a course in elementary science education to give it a futuristic vision. **2.02.** Established arrangements with a field site for the piloting of a student teaching component with a science emphasis.

3.

Type of Action: Technical - Practical

Activity level: University/School

Activities: The development of plans for inservice science education.

3.01. Submitted grant proposals to prepare elementary science teachers at the inservice level.

3.02. Explored potential locations for the establishment of elementary science emphasis sites.

4.

Type of Action: Practical - Emanicpatory

Activity level: University/School

Activities: The preparation of scholarly reports, presentations, and proposals on the outcomes/extension of project activity at SJSU.

4.01. Action research components of the project were reported at AETS (Association for the Education of Teachers in Science) and NARST(National Association for Research in Science Teaching) Conferences (Science Educator).

4.02. Presentations at NSTA (National Association Science (Teachers).

4.03. Received Innovation in Teaching and Learning Fellowship (Science Educator).

5.

Type of Action: Technical

Activity level: University

Activities: The establishment of a collaborative relationship with three science professors of undergraduate science courses for future outreach science education programs with elementary classrooms.

5.01 Developed a future plan of action for Cycle II - based on reflections.